

In the Specification

Please amend paragraph 19 as follows:

FIG. 2 illustrates a schematic of the loop filter circuit 2 in relation to the main charge pump circuit 5 and the auxiliary charge pump circuit 8, in accordance with embodiments of the present invention. The loop filter circuit 2 comprises a first capacitor 4, a second capacitor 18 (e.g., filter capacitor), and a resistor 12. The first capacitor 4 is electrically connected to the resistor 12. The resistor 12 is electrically connected to the second capacitor 18. The first capacitor 4 is in parallel with the resistor 12 and the second capacitor 18. The resistor 12 comprises a fixed resistance R1. The first capacitor 4 comprises a fixed capacitance C1. The second capacitor 18 comprises a fixed capacitance C2. The main charge pump circuit 5 may inject (i.e., source) current to the loop filter circuit 2. Alternatively, the main charge pump circuit 5 may remove (i.e., sink) current from the loop filter circuit 2. The source or sink function of the main charge pump circuit 5 may be controlled by a user. The auxiliary charge pump circuit 8 is electrically connected to the loop filter circuit 2 in parallel with the second capacitor 18. The auxiliary charge pump circuit 8 may inject (i.e., source) current to the second capacitor 18. Alternatively, the auxiliary charge pump circuit 8 may remove (i.e., sink) current from the second capacitor 18. The source or sink function of the auxiliary charge pump circuit 8 may be controlled by the user. The main charge pump circuit 5 may comprise an adjustable gain control 7 so that the user may vary a current gain of the main charge pump circuit 5 (Gm). The auxiliary charge pump circuit 8 may comprise an adjustable gain control 9 so that the user may vary a current gain of the auxiliary charge pump circuit 8 (Ga). By changing the current gain Ga of the auxiliary charge pump circuit 8 in relation to the current gain Gm of the main charge pump circuit

5, an effective capacitance value of the second capacitor 18 (C_{eff}) may be controlled. The effective capacitance value C_{eff} is a value of capacitance that the second capacitor 18 appears to have. Although the second capacitor 18 comprises the fixed capacitance value C₂, the effective capacitance C_{eff} value is higher or lower than the fixed capacitance value C₂. By changing both gains G_a and G_m relative to each other, a wide range of effective capacitance values C_{eff} for the second capacitor 18 is obtained. When the main charge pump circuit 5 and the auxiliary charge pump circuit 8 both flow current in a same direction (i.e., the main charge pump circuit 5 and the auxiliary charge pump circuit 8 both sink current or both source current), a value for C_{eff} is determined by the following first equation: $C_{eff} = (C_2 * G_m) / (G_m + G_a)$. Using the first equation, C_{eff} decreases as G_a increases. When the main charge pump circuit 5 and the auxiliary charge pump circuit 8 each flow current in opposite directions (i.e., the main charge pump circuit 5 sinks current and the auxiliary charge pump circuit 8 sources current or vice versa), a value for C_{eff} is determined by the following second equation: $C_{eff} = (C_2 * G_m) / (G_m - G_a)$ with a limitation that G_a < G_m. Using the second equation, C_{eff} increases as G_a increases. It is readily apparent that if both G_m and G_a are varied, then C_{eff} can be varied over a wider range then if just G_m or G_a is varied. For example, if G_m = 1, G_a = .5, and C₂ = 350 picofarads (pF) then using the first equation produces a C_{eff} of 233pF and using the second equation produces a C_{eff} of 700pF thereby giving C_{eff} a range of 233pF-700pF. The variation of C_{eff} allows for optimization of phase lock loop circuit 1 parameters such as, inter alia, bandwidth, peaking/damping factor (?), noise reduction, etc. A relationship between the damping factor ? and C_{eff} and is shown by the following equation: